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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,097	12/10/2003	Daniel W. Bedell	HIT1P023/HSJ920030085 US1	2439

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EXAMINER	
CHACKO DAVIS, DABORAH	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,097	BEDELL ET AL.	
	Examiner	Art Unit	
	Daborah Chacko-Davis	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29 and 31-36* is/are pending in the application.

4a) Of the above claim(s) *29 and 31-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-8, 13-22, and 27-28, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al).

Breyta, in [0008], [0009], [0010], [0011], [0071], and in figures 5-8, discloses a method of forming a metal layer on the substrate by coating the substrate with a release layer (barrier layer) that comprises a polyphenolic polymer with repeating monomeric units and having the formula recited in claims 1, and 15, and is antireflective; coating the adhesive layer (release layer) with a top imaging layer (top layer) of photoresist material; exposing the photoresist layer through a mask; removing a portion of the top imaging layer so as to form an exposed portion of the barrier layer (adhesive layer), removing the exposed portion of the barrier layer (see figures 5-6) as a result of which an undercut is formed under the top imaging layer; and depositing a metal layer onto the exposed portion of the substrate (claims 1, 7-8, 13-15, 21-22, and 27-28). Breyta, in [0010], [0012], discloses that the substrate includes a seed layer (adhesion promoter layer), the release layer being formed on the adhesion promoter layer (seed layer) (claims 2, 16). Breyta, in [0015], and [0016], discloses that the release layer

composition may comprise 100% of polyphenolic polymer (claims 3, 17). Breyta, in [0073], discloses that the release layer (monolayer, reference 2 of figure 1) (barrier layer) was spin coated on to the substrate (claims 4-5, 18-19). Breyta, in [0013], discloses that only one of R_1, R_2, R_3, R_4, and R_5 is a hydroxyl group (claims 6, and 20).

The difference between the claims and Breyta is that Breyta does not disclose that the material is formed on the exposed portion of the substrate by plating.

Whewell, in col 6, lines 39-47, discloses plating the exposed portion of the substrate with a material layer.

Therefore, it would be obvious to a skilled artisan to modify Breyta by replacing the sputtering process with a plating process as suggested by Whewell because Whewell, in col 4, lines 46-59, discloses that the metal layer can be either electroplated or sputtered onto the exposed portion of the substrate, and Whewell, in col 5, lines 35-39, discloses that the preferred method of depositing the material layer onto the exposed portion of the substrate is plating because it is less expensive and less time consuming than sputtering.

3. Claims 9-11, and 23-25, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al) as applied to 1-8, 13-22, and 27-28, and further in view of U. S. Patent No. 6,866,987 (Lee).

Breyta in view of Whewell is discussed in paragraph no. 2.

The difference between the claims and Breyta in view of Whewell is that Breyta

in view of Whewell does not disclose that the developer does not remove the exposed portion of the barrier layer (claims 9, and 23). Breyta in view of Whewell does not disclose that the barrier layer is removed by reactive ion etching (claims 10, and 24). Breyta in view of Whewell does not disclose that the barrier layer is removed by milling (claims 11, and 25).

Lee, in col 3, lines 42-57, and in col 4, lines 9-15, discloses that the exposed portions of the barrier layer (layer beneath the imaging photoresist layer, under layer resist) is not removed by the developer, and that the exposed portion of the under layer resist (barrier layer) can be removed by milling or RIE using the top layer photoresist as the mask.

Therefore, it would be obvious to a skilled artisan to modify Breyta in view of Whewell by employing the etching methods suggested by Lee because Lee, in col 3, lines 55-64, and in col 4, lines 10-15, discloses that the exposed layer of resist beneath the top layer resist can either be developed or milled or etched (RIE) such that etching occurs only in the direction normal or near normal to the substrate surface resulting in a controlled undercut.

4. Claims 12, and 26, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al) as applied to claims 1-8, 13-22, and 27-28 above, and further in view of U. S. Patent No. 6,218,056 (Pinarbasi et al).

Breyta in view of Whewell is discussed in paragraph no. 2.

The difference between the claims and Breyta in view of Whewell is that Breyta in view of Whewell does not disclose that removing the exposed portion of the barrier layer does not create undercuts under the photoresist (claims 12, and 26).

Pinarbasi, in col 6, lines 38-54, discloses that the release layer (beneath the photoresist layer mask) is exposed, for removal, to the e-beam and is scissioned and not necessarily undercut (see figures 10, and 11).

Therefore, it would be obvious to a skilled artisan to modify Breyta in view of Whewell by employing the etching methods suggested by Pinarbasi because Pinarbasi, in col 6, lines 55-67, in col 7, lines 1-7, discloses that exposing the release layer to e-beam results in the use of weak developers that can be developer-controlled so as to precisely define, and control the height and the length of the undercuts formed in the release layer under the top photoresist layer.

5. Claim 36, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al) and U. S. Patent No. 5,006,202 (Hawkins et al., hereinafter referred to an Hawkins).

Breyta, in [0008], [0009], [0010], [0011], [0071], and in figures 5-8, discloses a method of forming a metal layer on the substrate by coating the substrate with a release layer (barrier layer) that comprises a polyphenolic polymer with repeating monomeric units and having the formula recited in claim 36, and is antireflective; coating the adhesive layer (release layer) with a top imaging layer (top layer) of photoresist material; exposing the photoresist layer through a mask; removing a portion of the top

imaging layer so as to form an exposed portion of the barrier layer (adhesive layer), removing the exposed portion of the barrier layer (see figures 5-6) as a result of which an undercut is formed under the top imaging layer; and depositing a metal layer onto the exposed portion of the substrate (claim 36).

The difference between the claims and Breyta is that Breyta does not disclose that the material is formed on the exposed portion of the substrate by plating. Breyta does not disclose that the barrier layer prevents cracks in the photoresist from transferring through the barrier layer and exposing portions of the substrate.

Whewell, in col 6, lines 39-47, discloses plating the exposed portion of the substrate with a material layer.

The difference between Breyta in view of Whewell is that Breyta in view of Whewell does not disclose a barrier layer that prevents cracks in the photoresist from transferring through the barrier layer and exposing portions of the substrate.

Hawkins, in col 3, lines 14-35, discloses that the substrate (SiO_2) is protected by the first protective layer (barrier layer) from the mechanical damage caused by the cracks produced in the photoresist layer.

Therefore, it would be obvious to a skilled artisan to modify Breyta by replacing the sputtering process with a plating process as suggested by Whewell because Whewell, in col 4, lines 46-59, discloses that the metal layer can be either electroplated or sputtered onto the exposed portion of the substrate, and Whewell, in col 5, lines 35-39, discloses that the preferred method of depositing the material layer onto the exposed portion of the substrate is plating because it is less expensive and less time

consuming than sputtering. It would be obvious to a skilled artisan to modify Breyta in view of Whewell by using the protective film layer to prevent the transfer of the cracks in the photoresist layer to the underlying substrate as taught by Hawkins, because Breyta uses a barrier layer under the photoresist layer, and Hawkins, in col 2, lines 60-66, discloses that the protective film layer protects the wafer and prevents the transfer of cracks created in the mask and thereby prevents unintentional etching on the wafer.

Response to Arguments

6. Applicant's arguments filed 02/28/2006, inregards to claims 1-28, have been fully considered but they are not persuasive. The 103 rejections made in the previous office action are maintained. Applicant's arguments with respect to new claim 36 have been considered but are moot in view of the new ground(s) of rejection. See paragraph no. 5.

A) Applicants argue that Whewell i) does not disclose the claimed undercut, ii) teaches away form the plating using an underlayer, and iii) indicates that plating in conjunction with a mask undercut is undesirable.

Whewell is not depended upon to disclose an undercut, or plating/undercut combination. Breyta is depended upon to disclose the barrier underlayer, and forming an undercut. Whewell is used to only disclose that the expensive sputtering process suggested by Breyta can be replaced with the inexpensive plating.

B) Applicants argue that Lee does not teach i) removing the exposed barrier layer, and ii) retaining the underlayer undercut after radiation and development, and that Pinarbasi does not teach nor suggest an undercut.

Lee teaches removal of the exposed portions of the barrier layer using an RIE or ion milling process via a top photoresist pattern mask. Additionally, Breyta teaches removing the exposed portion of the barrier layer. Applicant's claims 12, and 26 recite no undercut under the photoresist, and Pinarbasi is depended upon to disclose the no undercut limitation. Pinarbasi is not depended upon to disclose undercut. Breyta teaches the formation of the undercut under the photoresist mask.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

May 9, 2006.

JOHN A. MCPHERSON
PRIMARY EXAMINER